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Carpenter et al.

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(54) **MONITORING WAGERING GAME MACHINES IN A NETWORK**

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A63F 13/00 (2006.01)

(52) **U.S. Cl.**
USPC **463/42**; 463/29

(58) **Field of Classification Search**
USPC 463/42, 24, 29
See application file for complete search history.

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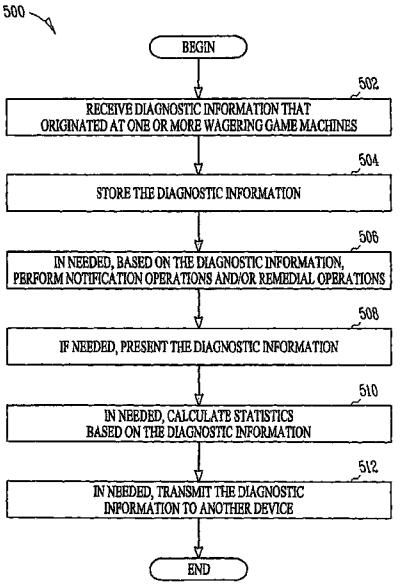
(57) **ABSTRACT**

Methods and apparatus for monitoring wagering game machines in a network are described herein. In one embodiment, a method for monitoring wagering game machines in a network includes receiving, in a wagering game machine, a wager associated with a wagering game. The method can also include receiving status information associated with a peripheral device or other component of the wagering game machine and transmitting diagnostic information indicating whether the peripheral device or other component needs service, wherein the diagnostic information is based at least in part on the status information.

22 Claims, 9 Drawing Sheets



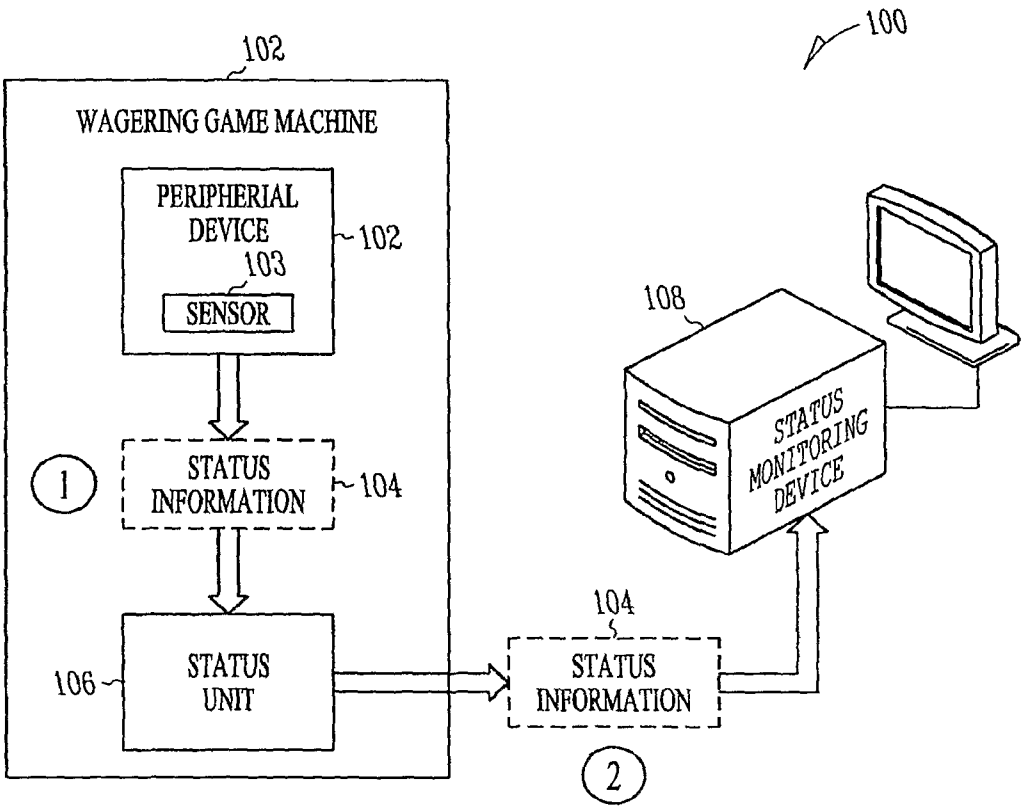

100
102
WAGERING GAME MACHINE
PERIPHERIAL DEVICE
103
SENSOR
102
1
STATUS INFORMATION
104
106
STATUS UNIT
104
STATUS INFORMATION
2
108
STATUS MONITORING DEVICE

FIG. 1

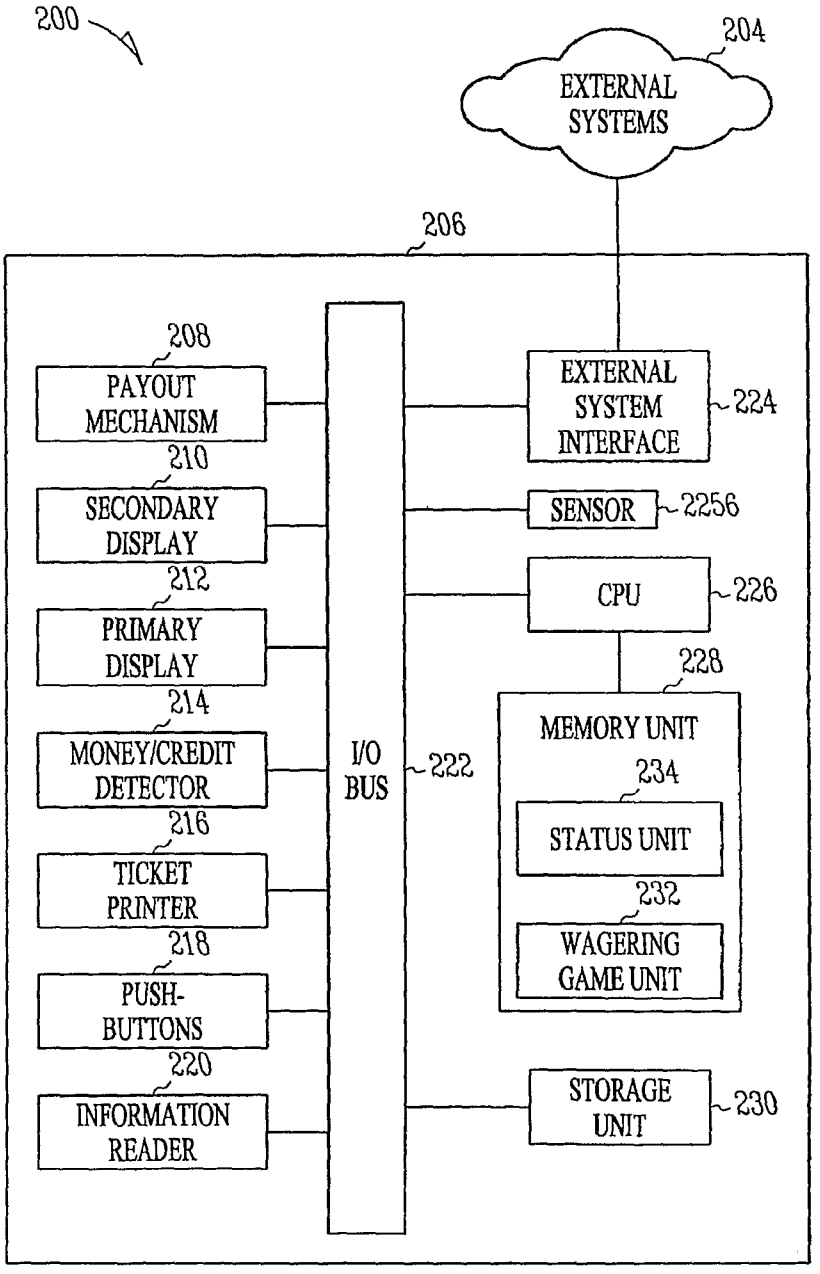

200
204
EXTERNAL SYSTEMS
206
208
PAYOUT MECHANISM
210
SECONDARY DISPLAY
212
PRIMARY DISPLAY
214
MONEY/CREDIT DETECTOR
216
TICKET PRINTER
218
PUSH-BUTTONS
220
INFORMATION READER
I/O BUS
222
EXTERNAL SYSTEM INTERFACE
224
SENSOR
2256
CPU
226
228
MEMORY UNIT
234
STATUS UNIT
232
WAGERING GAME UNIT
STORAGE UNIT
230

FIG. 2

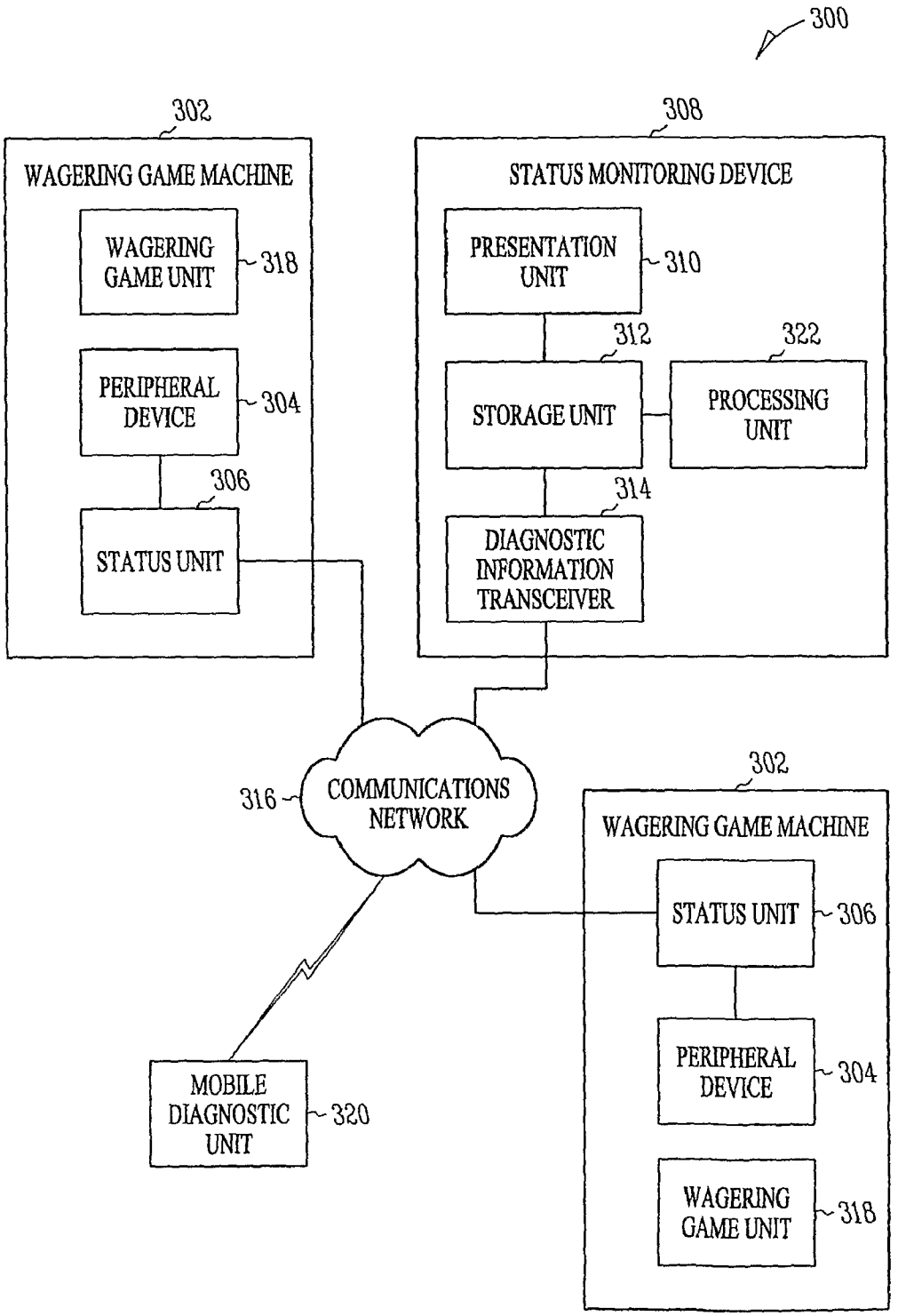

300
302
WAGERING GAME MACHINE
WAGERING GAME UNIT
318
PERIPHERAL DEVICE
304
306
STATUS UNIT
308
STATUS MONITORING DEVICE
PRESENTATION UNIT
310
312
322
STORAGE UNIT
PROCESSING UNIT
314
DIAGNOSTIC INFORMATION TRANSCEIVER
316
COMMUNICATIONS NETWORK
302
WAGERING GAME MACHINE
STATUS UNIT
306
PERIPHERAL DEVICE
304
WAGERING GAME UNIT
318
MOBILE DIAGNOSTIC UNIT
320

FIG. 3

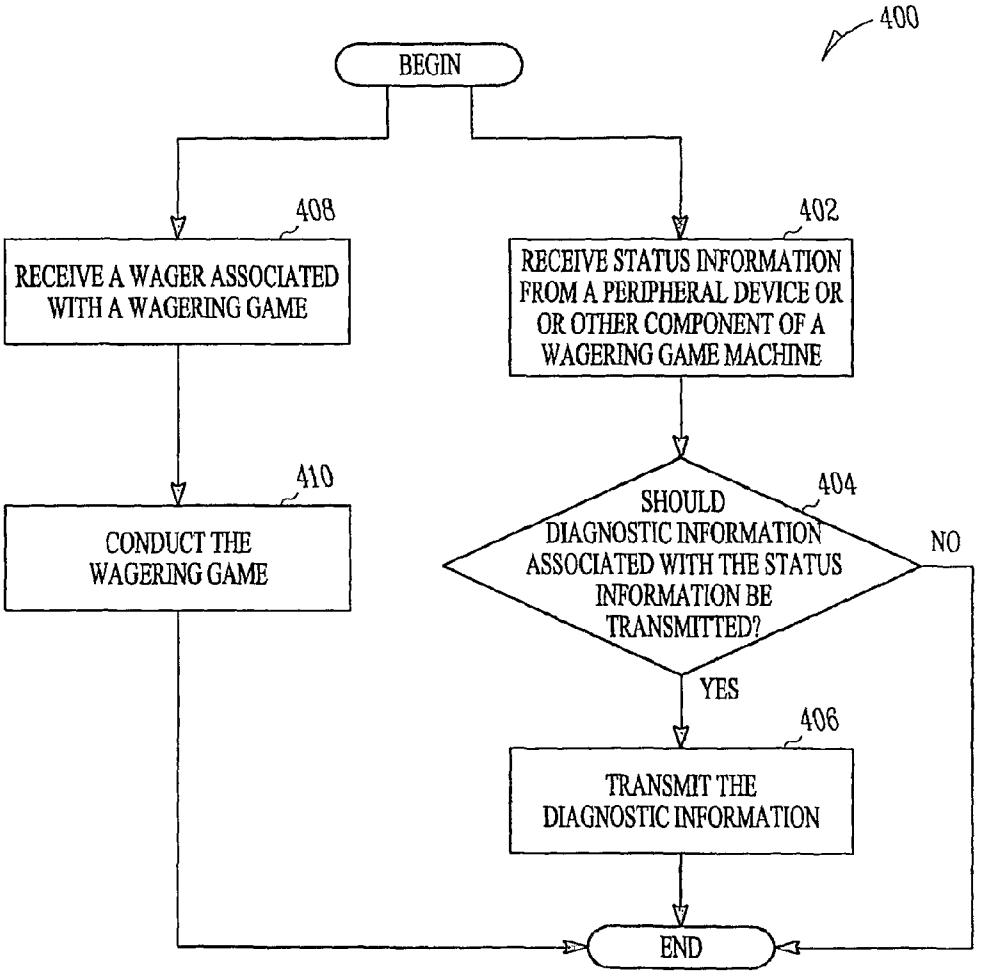

400
BEGIN
408
RECEIVE A WAGER ASSOCIATED WITH A WAGERING GAME
402
RECEIVE STATUS INFORMATION FROM A PERIPHERAL DEVICE OR OR OTHER COMPONENT OF A WAGERING GAME MACHINE
410
CONDUCT THE WAGERING GAME
404
SHOULD DIAGNOSTIC INFORMATION ASSOCIATED WITH THE STATUS INFORMATION BE TRANSMITTED?
NO
YES
406
TRANSMIT THE DIAGNOSTIC INFORMATION
END

FIG. 4

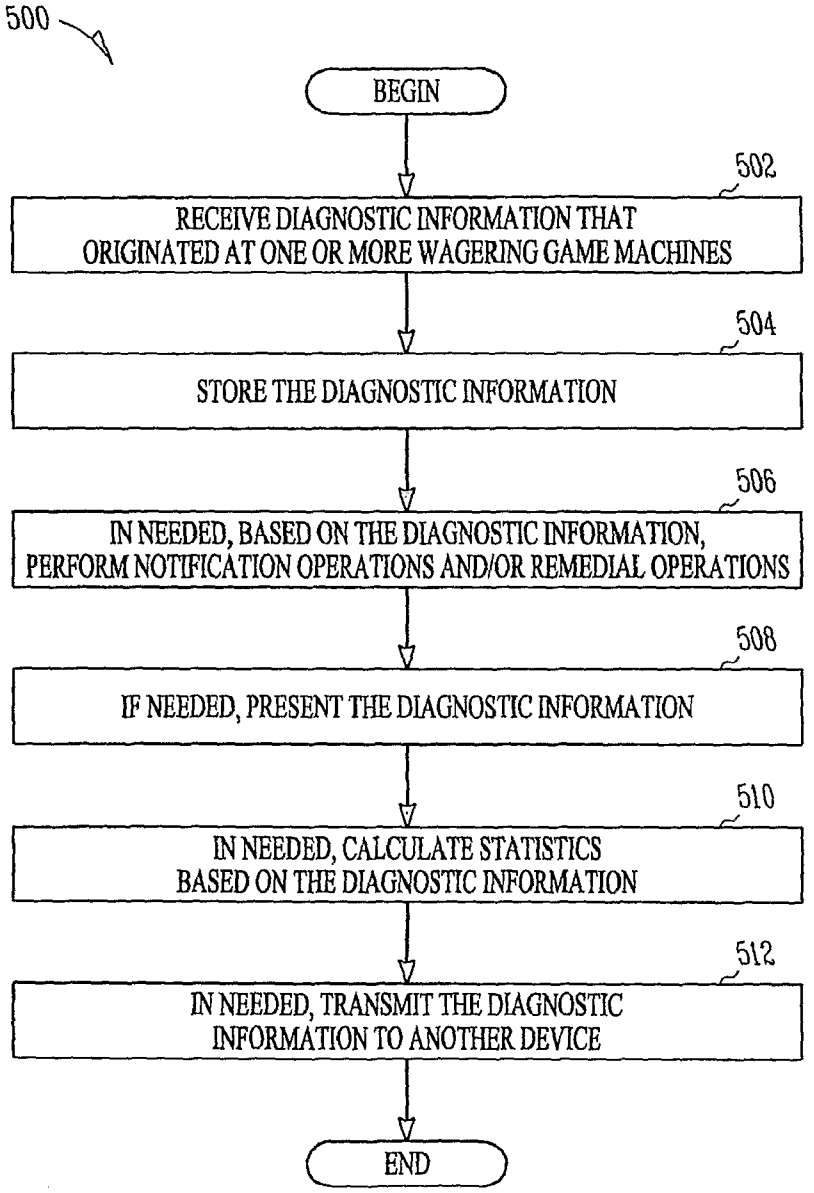
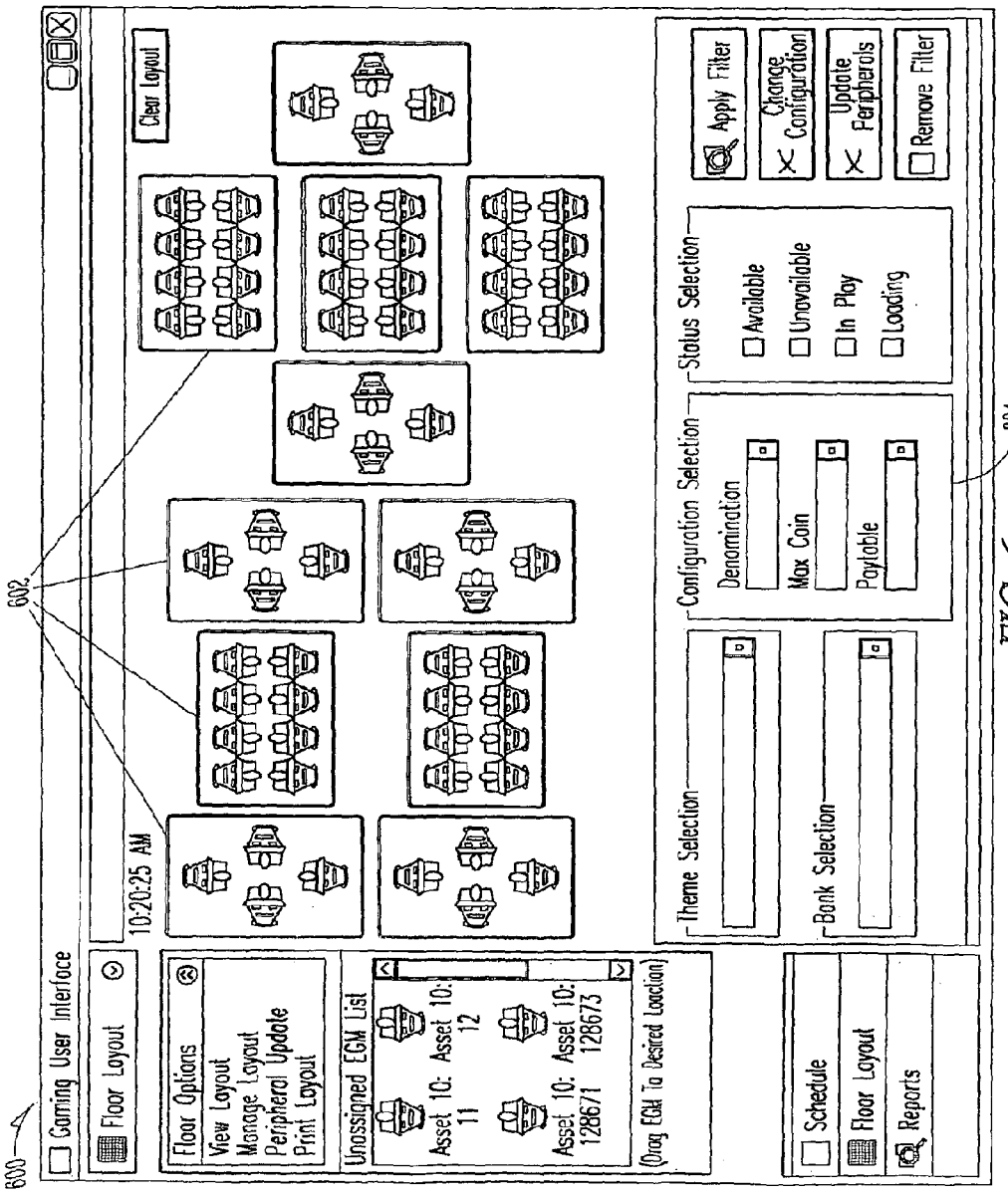

500
BEGIN
502
RECEIVE DIAGNOSTIC INFORMATION THAT ORIGINATED AT ONE OR MORE WAGERING GAME MACHINES
504
STORE THE DIAGNOSTIC INFORMATION
506
IN NEEDED, BASED ON THE DIAGNOSTIC INFORMATION, PERFORM NOTIFICATION OPERATIONS AND/OR REMEDIAL OPERATIONS
508
IF NEEDED, PRESENT THE DIAGNOSTIC INFORMATION
510
IN NEEDED, CALCULATE STATISTICS BASED ON THE DIAGNOSTIC INFORMATION
512
IN NEEDED, TRANSMIT THE DIAGNOSTIC INFORMATION TO ANOTHER DEVICE
END

FIG. 5


600
Gaming User Interface
Floor Layout
Floor Options
View Layout
Manage Layout
Peripheral Update
Print Layout
Unassigned EGM List
Asset ID: Asset ID:
11 12
Asset ID: Asset ID:
128671 128673
(Drag EGM To Desired Location)
10:20:25 AM
Clear Layout
602
Schedule
Floor Layout
Reports
Theme Selection
Bank Selection
Configuration Selection
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Status Selection
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In Play
Loading
Apply Filter
Change Configuration
Update Peripherals
Remove Filter
604

FIG. 6

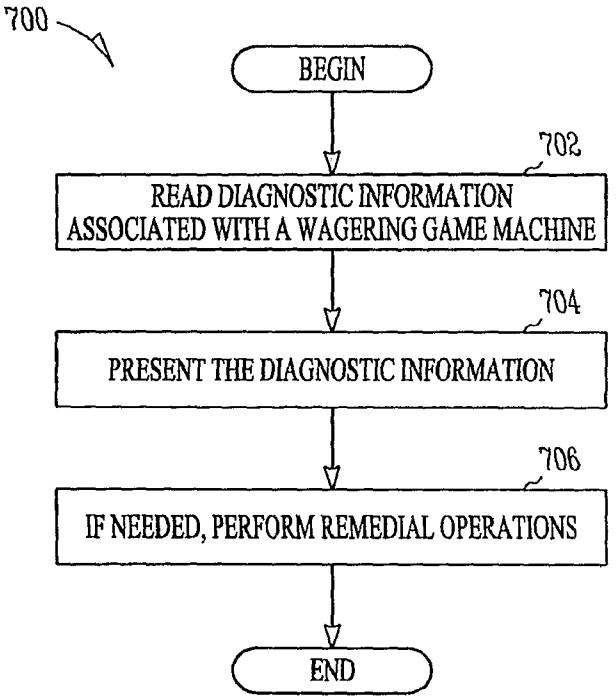

700
BEGIN
702
READ DIAGNOSTIC INFORMATION ASSOCIATED WITH A WAGERING GAME MACHINE
704
PRESENT THE DIAGNOSTIC INFORMATION
706
IF NEEDED, PERFORM REMEDIAL OPERATIONS
END

FIG. 7

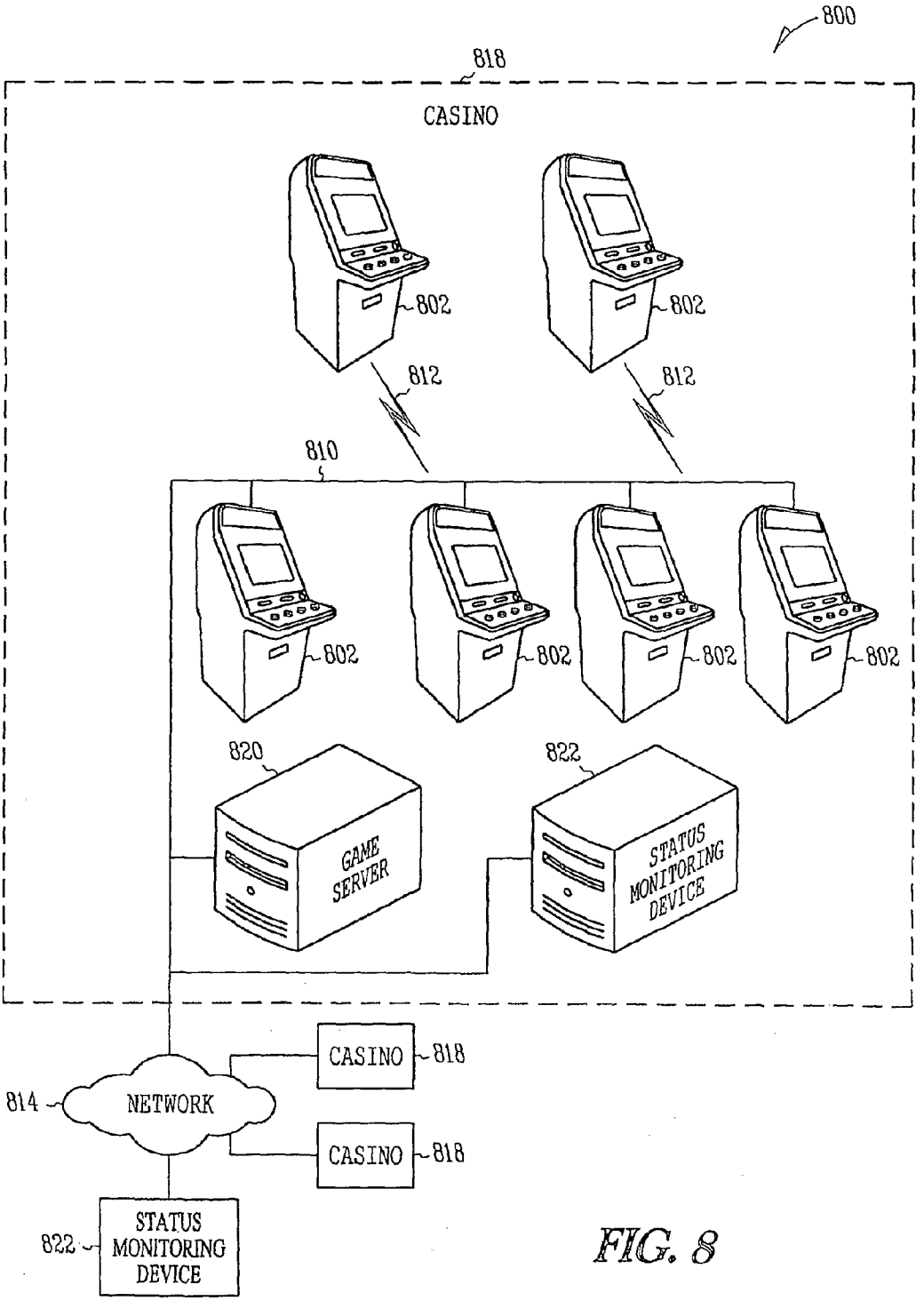

800
818
CASINO
802
802
812
812
810
802
802
802
802
820
822
GAME SERVER
STATUS MONITORING DEVICE
CASINO
818
814
NETWORK
CASINO
818
822
STATUS MONITORING DEVICE

FIG. 8

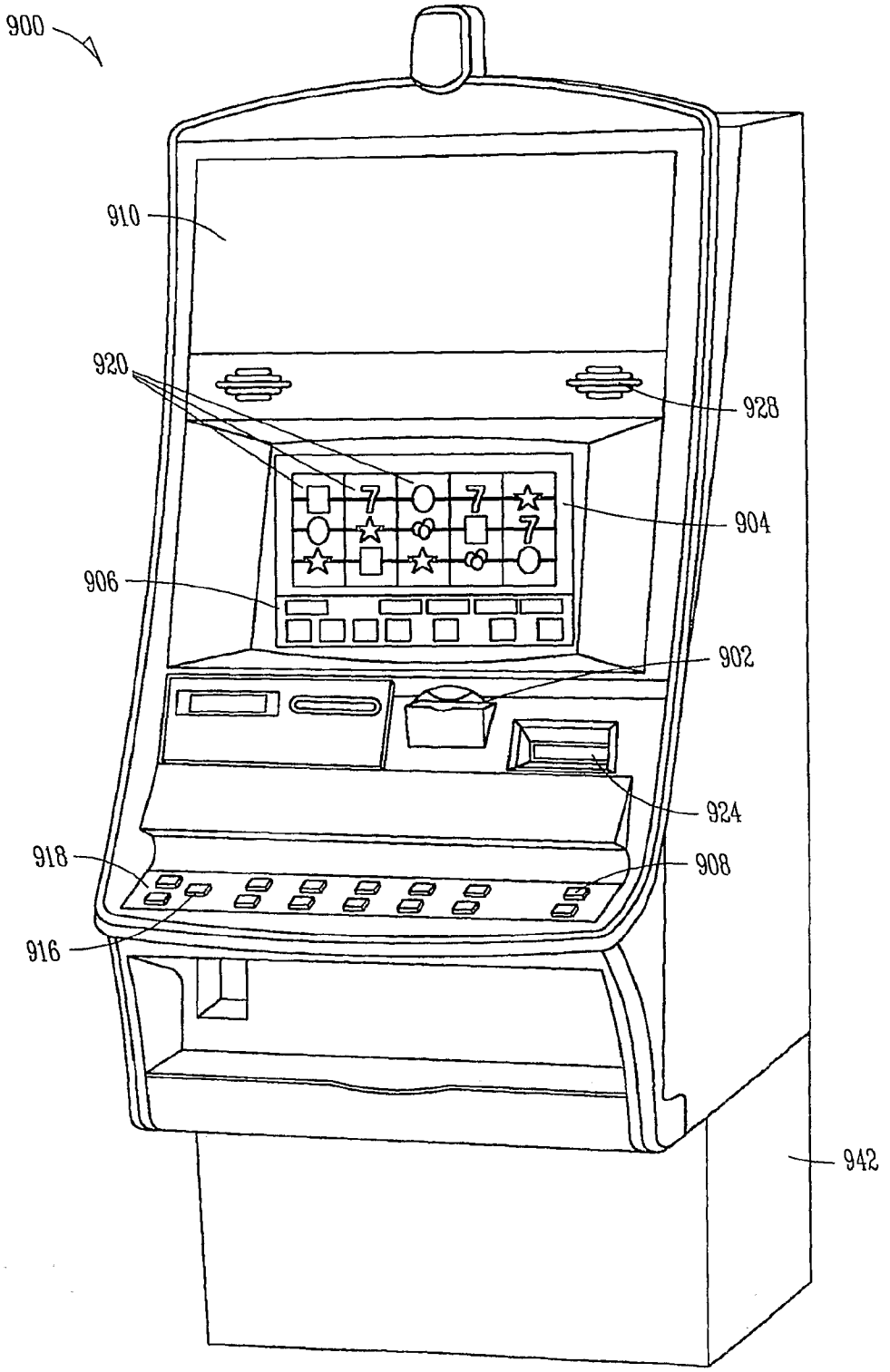


FIG. 9

MONITORING WAGERING GAME MACHINES IN A NETWORK

RELATED APPLICATIONS

This patent application is a U.S. National Stage Filing under 35 U.S.C. 371 from International Patent Application Serial No. PCT/US2006/047955, filed Dec. 15, 2006, and published on Jul. 5, 2007 as WO 2007/075441 A2 and republished as WO 2007/075441 A3, which claims the benefit of priority of U.S. Provisional Patent Application Ser. No. 60/743,042 filed on Dec. 15, 2005 and entitled "Monitoring Wagering Game Machines in a Network", the contents of which are incorporated herein by reference in their entirety.

LIMITED COPYRIGHT WAIVER

FIELD

This invention relates generally to the field of wagering game machines and more particularly to the field of wagering game machine maintenance and repair.

BACKGROUND

A wide variety of computerized wagering game machines are now available to casino operators and players. Computerized wagering game machines range from slot machines to games that are traditionally played live, such as poker, blackjack, roulette, etc. These wagering game machines provide many benefits to game owners and players, including increased reliability over mechanical machines, greater game variety, improved sound and animation, and lower overall management cost.

When technicians initially deploy wagering game machines for use in casinos, they typically manually wire the machines into wagering game networks and manually configure numerous settings. For example, the technicians may configure settings such as currency denominations for bill validators, screen resolution for video displays, volume for an audio devices, etc. Technicians often configure gaming machine settings by toggling DIP switches, moving expansion board jumpers, setting various dials and knobs, and paging through complicated set-up menus.

After deploying the wagering game machines into operation, technicians typically expend considerable efforts maintaining and repairing the machines. Technicians often utilize a variety of resources, such as service manuals and schematics, to facilitate the maintenance/repair process. However, despite these resources, even the most experienced technicians have difficulties maintaining and repairing wagering game machines in the field. Additionally, the maintenance/repair process can be complicated by a need for specialized tools and replacement parts.

BRIEF DESCRIPTION OF THE FIGURES

The present invention is illustrated by way of example and not limitation in the Figures of the accompanying drawings in which:

FIG. **1** is a dataflow diagram illustrating dataflow in a system for remotely monitoring wagering game machine components, according to example embodiments of the invention;

FIG. **2** is a block diagram illustrating a wagering game machine, according to example embodiments of the invention;

FIG. **3** is a block diagram illustrating a system for reporting and processing repair/maintenance information, according to example embodiments of the invention;

FIG. **4** is a flow diagram illustrating operations for receiving and transmitting information about peripheral devices or other components of a wagering game machine, according to example embodiments of the invention;

FIG. **5** is a flow diagram illustrating operations for processing information about wagering game machine peripheral devices or other components, according to example embodiments of the invention;

FIG. **6** is a diagrammatic illustration of a graphical user interface for presenting diagnostic information, according to example embodiments of the invention;

FIG. **7** is a flow diagram illustrating operations for receiving and presenting diagnostic information in mobile device, according to example embodiments of the invention;

FIG. **8** is a block diagram illustrating a wagering game network, according to example embodiments of the invention; and

FIG. **9** is a block diagram illustrating a wagering game network, according to example embodiments of the invention.

DESCRIPTION OF THE EMBODIMENTS

Systems and methods for monitoring wagering game machines in wagering game networks are described herein. This description of the embodiments is divided into five sections. The first section provides an introduction to embodiments of the invention. The second section describes example operating environment, while the third section describes example operations performed by some embodiments of the invention. The fourth section describes an example wagering game machine and the fifth section provides some general comments.

Introduction

This section introduces embodiments of a system for monitoring wagering game machines in a wagering game network. Embodiments of the invention enable operators to remotely determine whether a wagering game machine's components need maintenance and/or repair. For example, embodiments of the system can remotely monitor a wagering game machine's ticket printer to determine whether it is low on toner or paper. If the system detects that the wagering game machine's printer is low on toner or paper, the system can electronically notify an attendant, who can refill the ticket printer's toner or paper. Thus, embodiments enable wagering game operators to detect and maintain/repair wagering game machine components before they become inoperable, avoiding potentially costly downtime. FIG. **1** describes an embodiment of the monitoring system in greater detail.

FIG. **1** is a dataflow diagram **100** illustrating dataflow in a system for remotely monitoring wagering game machine components, according to example embodiments of the invention. As shown in FIG. **1**, the system includes a wagering game machine **101** including a status unit **106** and a peripheral device **102** (e.g., a ticket printer, bill validator, card

reader, etc.). The peripheral device **102** can include a peripheral device sensor **103** that can sense a service status of the peripheral device **102**. The peripheral device **102** can generate status information **104**, which can include the service status sensed by peripheral device sensor **103** and any other information suitable for indicating the service status of the peripheral device **102**. In addition to the service statuses described herein, the sensor **103** can also sense whether the peripheral device **102** is in a power-on mode or in a temporary power-off mode into which the peripheral device can switch to ensure a longer lifetime of the peripheral device **102** (e.g., hard drive being parked for a period of time to ensure longevity). The status unit **106** can communicate with a remotely located status monitoring device **108**. The data flow occurs in two stages.

At stage **1**, the status unit **106** receives status information from the peripheral device **102**. The status information **104** can indicate that the peripheral device needs to be serviced (i.e., maintained or repaired).

At stage **2**, the status unit **106** transmits the status information **104** to the status monitoring device **108**. After the status monitoring device **108** receives the status information **104**, it can notify an attendant that the peripheral device **102** needs maintenance or repairs.

These and other features will be described in more detail below. The next section describes example wagering game machines in more detail.

Example Operating Environment

The section describes an example operating environment in which embodiments can be practiced. In particular, FIG. **2** presents an example wagering game machine capable of monitoring its peripheral devices, whereas FIG. **3** describes a wagering network in which a status information processor can receive and process status information about peripheral devices. The discussion continues with FIG. **2**.

FIG. **2** is a block diagram **200** illustrating a wagering game machine, according to example embodiments of the invention. As shown in FIG. **2**, the wagering game machine **206** includes a central processing unit (CPU) **226** connected to a memory unit **228**, which includes a wagering game unit **232** and status unit **234**. In one embodiment, the wagering game unit **232** can receive wagers while conducting any suitable casino-style wagering game, such as video poker, video blackjack, video slots, video lottery, etc. In one embodiment, the status unit **234** receives status information from one or more of the peripheral devices (e.g., the ticket printer **216**, payout mechanism **208**, etc.) and transmits the status information to a status monitoring device (see FIG. **3**). Additionally, the status unit **234** can monitor hardware and software that are not part of the wagering game machine's peripheral devices. For example, the status unit **234** can monitor a hard disk drive (not shown), expansion card (not shown), network interface unit **224**, CPU **226**, memory unit **228**, or other device by receiving status information from the wagering game machine's operating system (not shown) that manages the hardware or software resources. Furthermore, the operating system can provide status information of other components of the wagering game machine **206** or status information relating to the wagering game machine **206**, based on readings obtained from one or more sensors **225**. Sensors **225** can sense a variety of service conditions of the other components or the wagering game machine **206**, including temperature of the CPU **226**, motherboard (not shown) or graphical processing unit (GPU), voltage of power or battery (not shown), speed of fans (not shown), dropped packets via network interface unit **224**, tilting (acceleration and shock detection) of the wagering game machine **206**, tampering with the wagering game machine **206**, exposure of the wagering game machine **206** to an electromagnetic field or electrostatic discharge, and the like.

The CPU **226** is also connected to an input/output (I/O) bus **222**, which facilitates communication between the wagering game machine's components and peripheral devices. The I/O bus **222** is connected to a plurality of peripheral devices, including a payout mechanism **208**, secondary display **210**, primary display **212**, money/credit detector **214**, ticket printer **216**, push-buttons **218**, information reader **220**, and storage unit **230**. The I/O bus **222** is also connected to a network interface unit **224**, which is connected to external systems **204** (e.g., a wagering game network).

In one embodiment, the wagering game machine **206** can include additional peripheral devices and/or more than one of each component shown in FIG. **2**. For example, in one embodiment, the wagering game machine **206** can include multiple network interface units **224** and multiple CPUs **226**. In one embodiment, any of the components can be integrated or subdivided. Additionally, in one embodiment, the components of the wagering game machine **206** can be interconnected according to any suitable interconnection architecture (e.g., directly connected, hypercube, etc.).

In one embodiment, any of the components of the wagering game machine **206** can include machine-readable media including instructions for performing operations described herein. Machine-readable media includes any mechanism that provides (i.e., stores and/or transmits) information in a form readable by a machine (e.g., a computer). For example, tangible machine-readable media includes read only memory (ROM), random access memory (RAM), magnetic disk storage media, optical storage media, flash memory devices, etc. Furthermore, components of the wagering game machine **206** can include any type of logic (e.g., digital logic) suitable for executing the operations described herein.

While the discussion of FIG. **2** describes various components of a wagering game machine, FIG. **3** describes additional details of a system for reporting and processing repair/maintenance information. This description continues with FIG. **3**.

FIG. **3** is a block diagram illustrating a system **300** for reporting and processing status information, according to example embodiments of the invention. As shown in FIG. **3**, the system **300** includes a plurality of wagering game machines **302**, each of which includes a wagering game unit **318**, peripheral device **304**, and status unit **306**. As noted above, the peripheral device can be a ticket printer, bill validator, etc. The status unit **306** can collect and transmit information indicating the repair/maintenance status of the peripheral device **304** or other component of the wagering game machine **302**.

In FIG. **3**, the wagering game machines **302** are connected to a status monitoring device **308** via a communications network **316**. The wagering game machines **302** can be stationary units wired into the communications network **316** or they can be mobile units (e.g., handheld devices) capable of wirelessly connecting to the communications network **316**.

The status monitoring device **308** includes a diagnostic information transceiver **314**, which can transmit and receive diagnostic information relating to repair/maintenance status of the wagering game machines' peripheral devices and other components. The diagnostic information transceiver is connected to a storage unit **312**, which is connected to a presentation unit **310** and processing unit **322**. The storage unit **312** can store the diagnostic information for future retrieval and

processing, whereas the processing unit **322** can calculate statistics and otherwise process the diagnostic information. The presentation unit **310** can present the diagnostic information through a graphical user interface and transmit electronic notifications about the repair/maintenance status of the wagering game machines **302**. The processing unit **322** can also transmit via the diagnostic information transceiver **314** diagnostic information to a vendor database/knowledge base system for additional processing, service, repair information, or use the diagnostic information to generate and transmit an incident report/service request to the vendor system.

The system **300** also includes a mobile diagnostic unit **320**. In one embodiment, the mobile diagnostic unit **320** is a handheld portable device capable of receiving and processing status information from the wagering game machines **302**. In another embodiment, the mobile diagnostic unit **320** is part of a notebook computer or portable other computing device.

In one embodiment, any component of the system **300** can include any type of logic (e.g., digital logic, machine-readable media including software, etc.) suitable for executing the operations described herein. Operations performed by these and other embodiments are described in greater detail in the next section.

Operations

This section describes operations performed by embodiments of the invention. In the discussion below, the flow diagrams will be described with reference to the block diagrams presented above. In certain embodiments, the operations are performed by instructions residing on machine-readable media (e.g., software), while in other embodiments, the operations are performed by hardware and/or other logic (e.g., firmware).

FIGS. **4-6** are discussed below. FIG. **4** describes operations for collecting and transmitting information about peripheral devices, while FIG. **5** describes operations for receiving and processing the information. This description will proceed with a discussion of FIG. **4**.

FIG. **4** is a flow diagram **400** illustrating operations for receiving and transmitting information about peripheral devices or other components of a wagering game machine, according to example embodiments of the invention. The flow diagram **400** commences in parallel at blocks **402** and **408**.

At block **402**, status information is received for a peripheral device or other component of the wagering game machine. For example, the status unit **306** receives status information from the peripheral device **304** or other component of the wagering game machine. In one embodiment, the peripheral device **304** or other component pushes the status information to the status unit **306**. Alternatively, the status unit **306** polls the peripheral device **304** or other component for the status information. The pushing and/or polling can occur periodically, randomly, or in response to an event (e.g., a request from the status monitoring device **308**). In yet another embodiment, the status unit **306** polls the wagering game machine's operating system (not shown) for status information about the peripheral device **304**. As noted above, the status unit **306** can receive status information about other components, such as memory, hard disk drives, expansion cards, etc.

The status information can include any information suitable for indicating the peripheral device's or component's service status. That is, the status information can include any information that indicates whether maintenance, repairs, or other services are needed immediately or sometime in the future. In one embodiment, the status information can include sensor readings, error codes, a memory dump, or other information for the peripheral device or other component, or the wagering game machine's operating system. The status information may indicate: a printer is running out of paper, a coin hopper is filling up with coins, a bill validator is rejecting a high number of bills, a light bulb is burned out, a print head is overheating, a switch is faulty, cooling fans are running for longer than usual, temperature of the CPU, motherboard or graphical process unit is higher than normal, network interface unit is dropping an increasing number of packets, the wagering game machine has been tilted, etc.

The flow continues at block **404**.

At block **404**, a determination is made about whether to transmit diagnostic information associated with the status information. For example, the status unit **306** determines whether to transmit the status information and/or other diagnostic information to the status monitoring device **308**. In one embodiment, the status unit **306** does not transmit diagnostic information every time it receives status information. Instead, the status unit **306** collects status information and begins creating diagnostic information based on the status information. For example, the status unit **306** may collect a series of temperature readings (or other information) for a peripheral device or other component. Based on the temperature readings (or other information), the status unit **306** creates diagnostic information indicating whether the peripheral device or other component needs service. After the diagnostic information satisfies certain rules, meets certain thresholds, or otherwise satisfies given conditions, the status unit **306** will transmit the diagnostic information to the status monitoring device **308** or the mobile diagnostic unit **320**.

In another embodiment, the status unit **306** simply forwards the status information after receiving it from the peripheral device **304**. Thus, the diagnostic information is made-up of the status information. In yet another embodiment, the status unit **306** periodically transmits diagnostic information or it transmits diagnostic information in response to a request from the status monitor device **308**.

The flow continues at block **406**.

At block **406**, the diagnostic information is transmitted. For example, the status unit **306** transmits the diagnostic information to the status monitoring device **308**. Alternatively, the status unit **306** can transmit the diagnostic information to the mobile diagnostic unit **320**. The status unit **306** can use any suitable transmission technology for transmitting the diagnostic information to the monitoring device **308**. For example, the status unit can use 802.11g, cellular technology, Ethernet, etc. From block **406**, the flow ends.

As shown in FIG. **4**, the operations at blocks **408** and **410** occur in parallel with the operations at block **402**, **404**, and **406**. At block **408**, a wager is received, where the wager is associated with a wagering game. For example, the wagering game unit **318** receives a wager associated with a wagering game. The flow continues at block **410**.

At block **410**, the wagering game is conducted. For example, the wagering game unit **318** determines and presents a result of the wagering game. In one embodiment, the result of the wagering game is determined by another machine, such as a remote wagering game server. From block **410**, the flow ends.

Even though the discussion of FIG. **4** describes the operations of the flow diagram **400** as executing in parallel, the operations at blocks **408** and **410** can occur before or after the operations at block **402**, **404**, and **406** or in any other suitable order.

This description continues with a discussion of FIG. **5**.

FIG. **5** is a flow diagram **500** illustrating operations for processing information about wagering game machine peripheral devices, according to example embodiments of the invention. The flow diagram **500** begins at block **502**.

At block **502**, diagnostic information is received, where the diagnostic information originates at one or more wagering game machines. For example, the status monitoring device's diagnostic information transceiver **314** receives diagnostic information from a wagering game machine's status unit **306**. The flow continues at block **504**.

At block **504**, the diagnostic information is stored. For example, the diagnostic information transceiver **314** stores the diagnostic information in the storage unit **312**. The flow continues at block **506**.

At block **506**, based on the diagnostic information, notification operations are performed, if needed. For example, the presentation unit **310** performs notification operations, if needed. In one embodiment, the notification operations include sending e-mails notifying attendants about maintenance or repairs needed for particular wagering game machines. In another embodiment, the notification operations include sending text messages using the short messaging service protocol or any other suitable messaging protocol. In yet another embodiment, the mobile diagnostic unit **320** can remotely perform any suitable remedial operations, such as rebooting a wagering game machine **302**, revising a wagering game machine's configuration information, switching-off malfunctioning peripheral devices or other components, etc. The flow continues at block **508**.

At block **508**, the diagnostic information is presented, if needed. For example, if needed, the presentation unit **310** presents the diagnostic information through a graphical user interface (GUI). FIG. **6** shows one such GUI.

FIG. **6** is a diagrammatic illustration of a graphical user interface (GUI) **600** for presenting diagnostic information, according to example embodiments of the invention. The GUI **600** can present diagnostic information associated with the wagering game machines **302** in a graphical format. As shown in FIG. **6**, the graphical user interface **600** includes a number of bank windows **602**, which depict different banks of wagering game machines laid-out on a casino floor. A bank window **602** can present color-coded information for each wagering game machine appearing therein. For example, a machine may be colored red when needing immediate service, yellow when needing maintenance soon, and green when needing nothing. The GUI **600** can also use color and flash codes for distinguishing between types of services. Additionally, the GUI **600** can be used in concert with audible indicators.

The GUI **600** also includes a control window **604** in which an attendant can enter service commands for remotely servicing the wagering game machines **302**.

Referring back to FIG. **5**, the flow continues at block **510**.

At block **510**, if needed, statistics are calculated based on the diagnostic information. For example, the processing unit **322** calculates statistics based on the diagnostic information. The statistics can track the number and type of repairs each peripheral device or other component has needed or the frequency with which services are needed. Additionally, the processing unit **322** can use the diagnostic information for deriving performance statistics, such as peripheral device or other component utilization, memory utilization, CPU utilization, printed pages per day, bills received per day, etc. Furthermore, the processing unit **322** can also transmit the diagnostic information to a vendor database/knowledge base system for additional processing, service or repair information, or use the diagnostic information to generate and transmit an incident report/service request to the vendor system The flow continues at block **512**.

At block **512**, if needed, the diagnostic information is transmitted to another device. For example, if needed, the diagnostic information transceiver **314** transmits diagnostic information to the mobile diagnostic unit **320** (see discussion of FIG. **7**). In one embodiment, the diagnostic transceiver **314** can transmit the diagnostic information and statistics to the wagering game machines' manufacturers and/or manufacturers of the peripheral devices, so they can better understand their wagering game machines or peripherals and the environments in which they are operating, as well as providing additional processing, service or repair information.

This description continues with a discussion of operations performed by embodiments of the mobile diagnostic unit **320**.

FIG. **7** is a flow diagram **700** illustrating operations for receiving and presenting diagnostic information in a mobile device, according to example embodiments of the invention. The flow diagram **700** begins at block **702**.

At block **702**, diagnostic information associated with a wagering game machine is received. For example, the mobile diagnostic unit **320** receives diagnostic information from the status monitoring device **308**. Alternatively, the mobile diagnostic unit **320** can receive diagnostic information from a gaming machine **302**. From block **702**, the flow continues at block **704**.

At block **704**, the diagnostic information is presented. For example, the mobile diagnostic unit **320** presents the diagnostic information in a graphical user interface, such as the GUI **600** of FIG. **6**.

In one embodiment, mobile diagnostic unit **320** is capable of determining its physical proximity to particular wagering game machines **302**. For example, the mobile diagnostic unit **320** can include global positioning system logic, radiofrequency logic, 802.11 logic, or other logic suitable for determining physical proximity to the gaming machines **320**. As a technician carries the mobile diagnostic unit **320** within proximity of a given wagering game machine **302**, the mobile diagnostic unit **320** can present diagnostic information associated with that wagering gaming machine, eliminating the technician's need to search for diagnostic information relevant the given machine.

The flow continues at block **706**.

At block **706**, if needed, remedial operations are performed, where the remedial operations are based at least in part on the diagnostic information. For example, the mobile diagnostic unit **320** performs remedial operations based on the diagnostic information. In one embodiment, the mobile diagnostic unit **320** can perform any suitable remedial operations, such as rebooting a wagering game machine **302**, revising a wagering game machine's configuration information, switching-off malfunctioning peripheral devices, etc. From block **706**, the flow ends.

This section described operations performed by embodiments of the invention, whereas the next section describes additional embodiments of the invention.

Example Wagering Game Networks and Wagering Game Machines

This section describes example wagering game machines and wagering game networks with which embodiments of the invention can be practiced.

Example Wagering Game Network

FIG. **8** is a block diagram illustrating a wagering game network **800**, according to example embodiments of the

invention. As shown in FIG. **8**, the wagering game network **800** includes a plurality of casinos **818** connected to a communications network **814**.

Each of the plurality of casinos **818** can include local area networks, which include a plurality of wagering game machines **802** connected to a game server **820**. In one embodiment, the gaming server **820** provides wagering game content and/or determines outcomes of wagering games presented by the wagering game machines **802**. In one embodiment, the wagering game machines **802**, status monitoring devices **822**, and/or the game servers **820** include hardware, software, and/or other logic for monitoring wagering game machines, as described herein. Status monitoring devices **822** can be located inside or outside the casinos **818**, being connected therewith via communications network **814**.

The components of each casino **818** can communicate over wired **810** and/or wireless connections **812**. Furthermore, they can employ any suitable connection technology, such as Bluetooth, 802.11, SONET/SDH, Ethernet, public switched telephone networks, etc.

Example Wagering Game Machine

FIG. **9** is a perspective view of a wagering game machine **900**, according to example embodiments of the invention. As shown in FIG. **9**, the wagering game machine **900** can be a computerized slot machine having the controls, displays, and features of a conventional slot machine.

The wagering game machine **900** can be mounted on a stand **942** or it can be constructed as a pub-style tabletop game (not shown). Additionally, the wagering game machine **900** can be a tablet or a portable unit. As a result, the wagering game machine **900** can be operated while players are standing or seated. Furthermore, the wagering game machine **900** can be constructed with varying cabinet and display designs. The wagering game machine **900** can incorporate any primary game such as slots, poker, or keno, and additional bonus round games. The symbols and indicia used on and in the wagering game machine **900** can take mechanical, electrical, or video form.

As illustrated in FIG. **9**, the wagering game machine **900** includes a coin slot **902** and bill acceptor **924**. Players can place coins in the coin slot **902** and paper money or ticket vouchers in the bill acceptor **924**. Other devices can be used for accepting payment. For example, credit/debit card readers/validators can be used for accepting payment. Additionally, the wagering game machine **900** can perform electronic funds transfers and financial transfers to procure monies from financial accounts. When a player inserts money in the wagering game machine **900**, a number of credits corresponding to the amount deposited are shown in a credit display **906**. After depositing the appropriate amount of money, a player can begin playing the game by pushing play button **908**. The play button **908** can be any play activator used for starting a wagering game or sequence of events in the wagering game machine **900**.

As shown in FIG. **9**, the wagering game machine **900** also includes a bet display **912** and one or more "bet" buttons on the panel **916**. The player can place a bet by pushing one or more of the bet buttons on the panel **916**. The player can increase the bet by one or more credits each time the player pushes a bet button. When the player pushes a "bet one" button **916**, the number of credits shown in the credit display **906** decreases by one credit, while the number of credits shown in the bet display **912** increases by one credit.

A player may end the gaming session or "cash-out" by pressing a cash-out button **918**. When a player cashes-out, the wagering game machine **900** dispenses a voucher or currency corresponding to the number of remaining credits. The wagering game machine **900** may employ other payout mechanisms such as credit slips (which are redeemable by a cashier) or electronically recordable cards (which track player credits), or electronic funds transfer.

The wagering game machine also includes a primary display unit **904** and a secondary display unit **910** (also known as a "top box"). The wagering game machine may also include an auxiliary video display **940**. In one embodiment, the primary display unit **904** displays a plurality of video reels **920**. According to embodiments of the invention, the display units **904** and **910** can include any visual representation or exhibition, including moving physical objects (e.g., mechanical reels and wheels), dynamic lighting, and video images. In one embodiment, each reel **920** includes a plurality of symbols such as bells, hearts, fruits, numbers, letters, bars or other images, which correspond to a theme associated with the wagering game machine **900**. Additionally, the wagering game machine **900** also includes an audio presentation unit **928**. The audio presentation unit **928** can include audio speakers or other suitable sound projection devices.

In one embodiment, the wagering game machine **900** includes hardware, software, or other logic for monitoring its components and peripheral devices, as described herein.

General

In this description, numerous specific details are set forth. However, it is understood that embodiments of the invention may be practiced without these specific details. In other instances, well-known circuits, structures and techniques have not been shown in detail in order not to obscure the understanding of this description. Note that in this description, references to "one embodiment" or "an embodiment" mean that the feature being referred to is included in at least one embodiment of the invention. Further, separate references to "one embodiment" in this description do not necessarily refer to the same embodiment; however, neither are such embodiments mutually exclusive, unless so stated and except as will be readily apparent to those of ordinary skill in the art. Thus, the present invention can include any variety of combinations and/or integrations of the embodiments described herein. Each claim, as may be amended, constitutes an embodiment of the invention, incorporated by reference into the detailed description.

Herein, block diagrams illustrate example embodiments of the invention. Also herein, flow diagrams illustrate operations of the example embodiments of the invention. The operations of the flow diagrams are described with reference to the example embodiments shown in the block diagrams. However, it should be understood that the operations of the flow diagrams could be performed by embodiments of the invention other than those discussed with reference to the block diagrams, and embodiments discussed with references to the block diagrams could perform operations different than those discussed with reference to the flow diagrams. Additionally, some embodiments may not perform all the operations shown in a flow diagram. Moreover, although the flow diagrams depict serial operations, certain embodiments could perform certain of those operations in parallel.

The invention claimed is:

1. A non-transitory machine-readable medium including instructions which when executed by a machine cause the machine to perform operations comprising:

receiving a wager associated with a wagering game;

collecting status information about a plurality of the machine's peripheral devices or other components over a period of time;

using the status information to derive diagnostic information, the diagnostic information representing a trend in the status information over the period of time;

determining whether the diagnostic information should be transmitted based on whether the diagnostic information satisfies a condition;

transmitting the diagnostic information to a remote device for evaluation after determining that the diagnostic information should be transmitted;

receiving a command to execute a remedial operation based on the evaluation; and executing the remedial operation.

2. The machine-readable medium of claim **1**, wherein the determining whether the diagnostic information should be transmitted comprises:

evaluating whether an event has occurred, wherein the event is related to the collected status information and wherein the event is selected from the group consisting of:

whether a threshold has been met, whether a certain time has elapsed, or whether a rule has been satisfied; and

determining that the diagnostic information should be transmitted when the event has occurred.

3. The machine-readable medium of claim **1**, wherein the transmitting of the diagnostic information informs an operator about the maintenance services needed by the ones of the plurality of peripheral devices or other components.

4. The machine-readable medium of claim **1**, wherein the collecting of service information includes periodically polling the plurality of peripheral devices, other components, or one or more sensors for the service information about the peripheral devices or other components.

5. The machine-readable medium of claim **1**, wherein the transmitting of the diagnostic information is performed in response to a request from the remote device.

6. The machine-readable medium of claim **1** further comprising:

compiling statistics about the maintenance services needed by the plurality of peripheral devices or other components, the statistics based at least in part on the status information.

7. A method comprising:

receiving, in a wagering game machine, a wager associated with a wagering game;

receiving over a period of time status information associated with a peripheral device or other component of the wagering game machine;

using the status information to derive diagnostic information via at least one processor, the diagnostic information representing a trend in the status information over the period of time;

determining whether diagnostic information should be transmitted based on whether the diagnostic information satisfies a condition;

transmitting diagnostic information to a remote device after determining that the diagnostic information should be transmitted;

receiving a command to execute a remedial operation from the remote device; and

executing the remedial operation.

8. The method of claim **7**, wherein the diagnostic information is destined for a remote status monitoring device which receives diagnostic information from a plurality of wagering game machines.

9. The method of claim **7**, further comprising using the diagnostic information to facilitate preventative maintenance.

10. The method of claim **7**, wherein the diagnostic information includes the status information.

11. The method of claim **7**, wherein the determining is based at least in part on whether a threshold has been met, whether a certain time has elapsed, or whether a rule has been satisfied.

12. The method of claim **7**, wherein the status information associated with the peripheral device or other component is received as a result of scheduled reporting, occurrence of an event, or a request from a remote device.

13. The method of claim **7**, further comprising transmitting the diagnostic information to at least one of: a wagering game machine manufacturer or a wagering game peripheral manufacturer.

14. An apparatus comprising:

a wagering game machine including,

a wagering game unit to receive a wager associated with a wagering game;

a device to perform an operation; and

a status unit operable to:

receive status information from the device over a period of time;

derive diagnostic information from the status information, where the diagnostic information represents a trend in the status information over the period of time;

determine whether diagnostic information should be transmitted based on whether the diagnostic information satisfies a condition; and

transmit the diagnostic information to a remote status monitoring device for evaluation after determining that the diagnostic information should be transmitted,

wherein the wagering game machine is to receive a command to execute a remedial operation based on the evaluation and execute the remedial operation.

15. The apparatus of claim **14**, wherein the device is one of a peripheral device and another component of the wagering game machine.

16. The apparatus of claim **14**, wherein the remote status monitoring device is further operable to, based on the diagnostic information, notify an attendant that the device needs service.

17. The apparatus of claim **14**, wherein the remote status monitoring device is further operable to transmit the diagnostic information to a portable diagnostic tool.

18. The apparatus of claim **14**, wherein the status unit is further operable to transmit the diagnostic information to a portable diagnostic tool.

19. The apparatus of claim **14**, wherein the remote status monitoring device is further operable to calculate statistics based on the diagnostic information.

20. The apparatus of claim **14**, wherein the remote status monitoring device uses the diagnostic information to facilitate preventative maintenance.

21. The tangible machine-readable medium of claim **1**, wherein the remedial operation comprises rebooting the machine.

22. The tangible machine-readable medium of claim **1**, wherein the remedial operation comprises disabling the peripheral device that indicates maintenance services needed.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 8,608,568 B2
APPLICATION NO. : 12/096001
DATED : December 17, 2013
INVENTOR(S) : Carpenter et al.

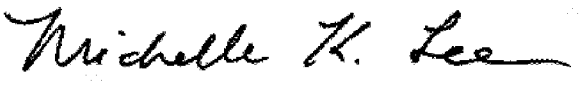
It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On the Title Page:

The first or sole Notice should read --

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1496 days.

Signed and Sealed this
Twenty-second Day of September, 2015



Michelle K. Lee
Director of the United States Patent and Trademark Office